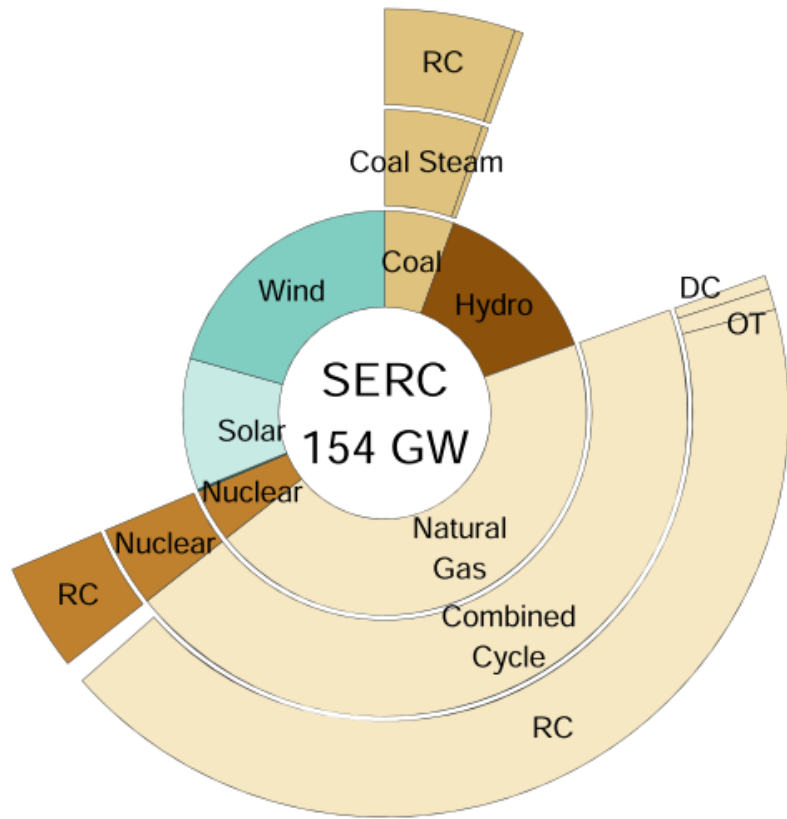
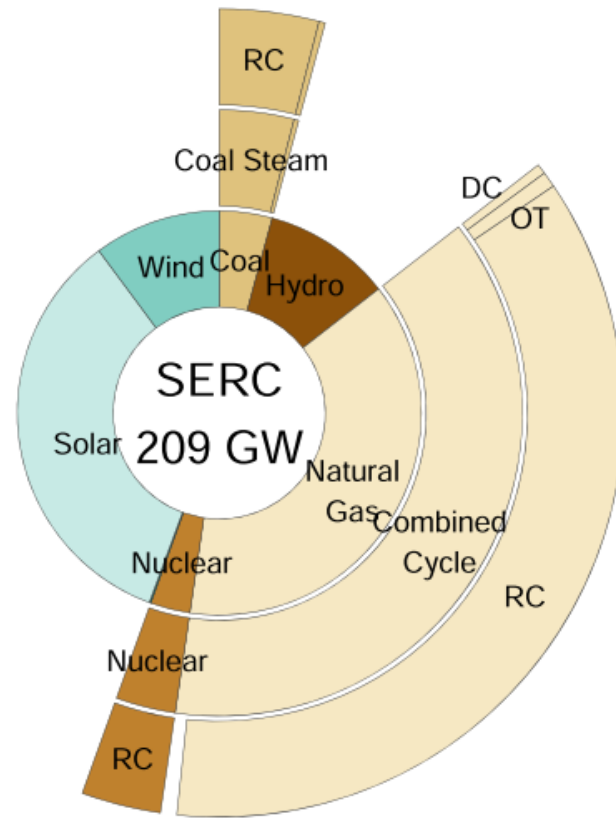


There may be synergies between building for climate resiliency and decarbonization



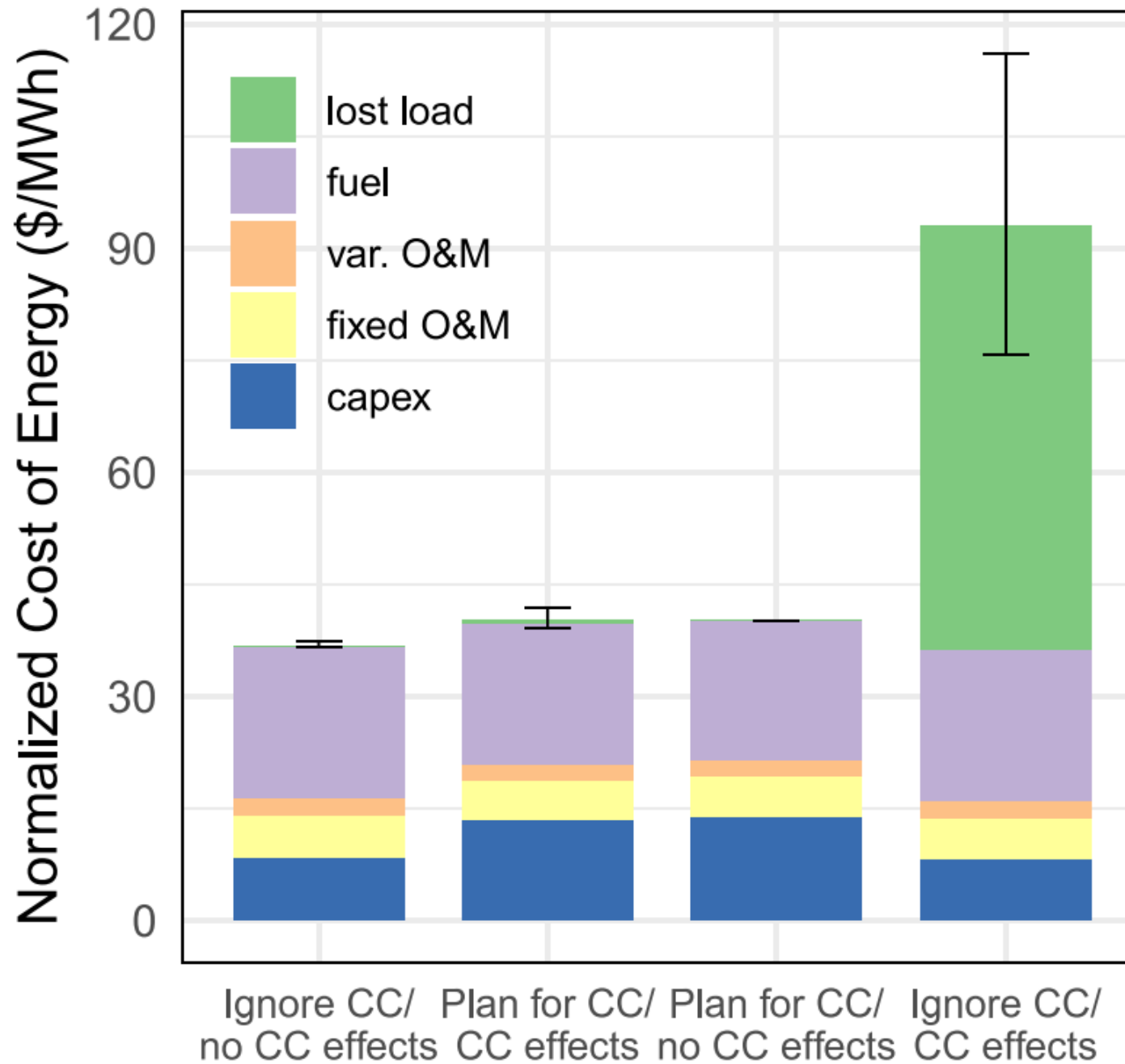
(a) Ref. case (50%)



(b) RCP 4.5 (50%)

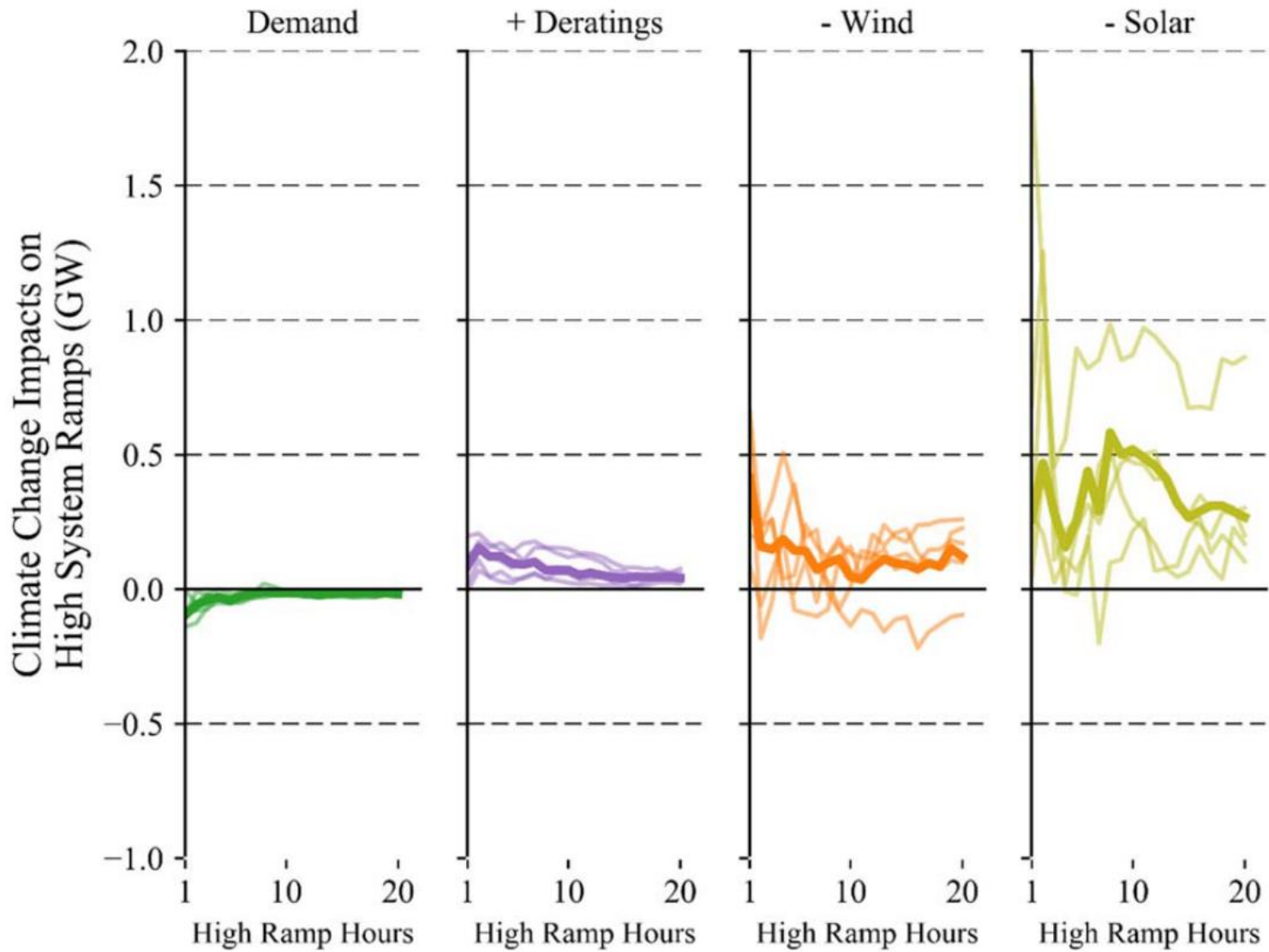
Final composition of the SERC's generator fleet in 2050 for each of the two scenarios (Reference and RCP 4.5) enforcing reductions on system-wide CO₂ emissions (percentages in parenthesis are the reductions in emissions). The numbers in the center of each plot show the total installed capacity in 2050. The inner layer of the pie chart shows the breakdown into the different fuel sources used by the power plants in SERC. The middle layer shows the types of generating technologies, where applicable, used for each type of fuel source. The outer layer presents the cooling technologies used in the respective thermoelectric generators. The codes "OT", "RC", and "DC" stand for, respectively, once-through cooling, recirculating cooling, and dry cooling.

50% CO₂ reduction



Comparison of normalized costs of energy in 2050 of the SERC fleets planned with 50% and 80% reductions in CO₂ emissions (compared to 2015). The values are the average of the simulations using data from 20 different GCMs. Error bars represent the 90% uncertainty range of the total cost over the 20 GCM simulations.

There is a need to better understand the climate impacts on renewable resources, which could pose challenges at operational timescales



Climate change impacts on high system ramps in demand (left) plus thermal deratings (second to left) minus wind generation (second to right) minus solar generation (i.e., net demand)(right) in ERCOT under RCP8.5 by the middle of the century.

Faded lines are median values across years for each climate change projection. Bold lines are the median values of those faded lines, i.e., the median values across climate change projections.

Citations

- Slide 2: Ralston-Fonseca, F., Craig, M., Jaramillo, P., Berges, M., Severnini, E., Loew, A., Zhai, H., Cheng, Y., Nijssen, B., Voisin, N. & Yearsley, J., "Effects of climate change on capacity expansion decisions of an electricity generation fleet in the Southeast U.S.," *Environmental Science and Technology* **55**, 2522–2531 (2021).
- Slide 3: Fonseca, F. R., Craig, M., Jaramillo, P., Bergés, M., Severnini, E., Loew, A., Zhai, H., Cheng, Y., Nijssen, B., Voisin, N. & Yearsley, J., "Climate-Induced Tradeoffs in Planning and Operating Costs of a Regional Electricity System," *Environmental Science & Technology* [acs.est.1c01334](https://doi.org/10.1021/acs.est.1c01334) (2021).
- Slide 5: Craig, M. T., Jaramillo, P., Hodge, B.-M., Nijssen, B. & Brancucci, C., "Compounding climate change impacts during high stress periods for a high wind and solar power system in Texas," *Environmental Research Letters* **15**, 024002 (2020).